

Title Turbulent Premixed Flames - Hydrodynamic Theory

Speaker Prof. Moshe Matalon

College of Engineering Caterpillar Distinguished Professor
Department of Mechanical Science and Engineering
University of Illinois at Urbana-Champaign
USA



Date & Time Tuesday, October 31, 2017 4:00 p.m.

Place I²CNER Hall, Ito campus, Kyushu University

Abstract

One of the most important quantities characterizing premixed turbulent combustion is the “turbulent flame speed” that allows predicting the average rate of energy release, or mean rate of fuel consumption in a combustor. The turbulent flame speed controls important design considerations of automotive engines, industrial gas turbines and industrial furnaces. The complex flame-turbulence interactions are addressed in this presentation using a fundamental model that exploits the multi-scale nature of the problem. The flame is modeled by a surface that separates burned from unburned gases and propagates relative to the fresh combustible mixture at a speed that depends on the local mixture and flow conditions, while the flow field is modified by gas expansion resulting from the heat released during combustion. The results, which are devoid of turbulence-modeling assumptions, and/or ad-hoc coefficients commonly used in turbulence studies, provide physically-based arguments for the complex flow-turbulence interactions occurring in premixed flames and provide scaling laws for the turbulent flame speed.

About the Speaker

Prof. Moshe Matalon received his undergraduate and Master’s education at Tel Aviv University, followed by a Ph.D. in Mechanical and Aerospace Engineering from Cornell University in 1977. He has worked at Cornell University, the Polytechnic Institute of New York, Northwestern University, and since 2007 has been at the University of Illinois at Urbana-Champaign, where he is the College of Engineering Caterpillar Distinguished Professor. Matalon’s research interests are in combustion theory, theoretical fluid mechanics and applied mathematics. He is Fellow of the American Physical Society, Institute of Physics and American Institute of Aeronautics and Astronautics (AIAA). He received several awards including the AIAA Pendray Aerospace Literature Award in 2010, the AIAA Fluid Dynamics award in 2016 and more recently (in 2017) the Numa Manson Medal of the Institute for the Dynamics of Explosions and Reacting Systems (IDERS). Matalon serves as Associate Editor of the *Journal of Fluid Mechanics* and is Editor-In-Chief of *Combustion Theory and Modelling*.

Host: Professor Petros Sofronis

For registration, please visit our website:

<http://i2cner.kyushu-u.ac.jp/>

Contact: Research Support and International Affairs division
International Institute for Carbon-Neutral Energy Research
Tel:092-802-6934 Email:wpikenkyu@jimu.kyushu-u.ac.jp

